

# Management Risk Factors Associated with Stillbirth

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## Introduction

The success of parturition depends on a variety of cow and herd factors. It has been previously documented that the rate of stillbirth in Holstein cattle is approximately 10-15% in first parity animals and 5-7% in multiparous animals. Stillbirth is defined as delivery of a dead calf or a calf that is born alive but dies within the first 24 hours of life. Stillbirth can have both direct and indirect impacts on cow and calf health. Therefore, identification of key risk factors and implementation of changes to routine protocols aimed at reducing the occurrence of these calving disorders will benefit the dairy operation.

## Materials and Methods

A large observational trial was conducted to investigate the farm level risk factors associated with stillbirth. The main data collection tool was a questionnaire. Milk production, reproduction and culling data for the years 2002-2005 was collected from 162 dairy producers. All data were stored in a spreadsheet or database program. The farm level management risk factors were studied for their association with stillbirth using a multi-level logistic model, using MLwiN. To construct this regression model, it was determined that a multi-stage model building approach would be suitable to evaluate the large number of variables. A multi-level linear regression model was used to evaluate the effect of stillbirth on milk production. The variable "herd" was introduced into both the logistic and linear regression models as a random effect to account for the effects of clustering within herd. Survival analyses were used to model the effects of stillbirth on risk of pregnancy and risk of culling. Both the linear regression and survival analysis models were calculated using STATA 9.2.

## Results

The herd-level incidence of stillbirth for cows calving in 2004 and 2005, ranged from 0% to 17.3%. The

mean herd-level incidence was 7.6%. The frequency of observation of the calving cow/heifer (both in late gestation and more specifically in the early stages of labour) had a very significant association with the delivery of a live calf. In this study, the use of a video camera system was associated with an increased rate of live calves being born (OR=1.44). Excessive body condition in pregnant heifers was associated with an increased risk of stillbirth. However, grouping of first-calf animals with mature cows, as well as having individual versus group calving pens did not have a significant association with the occurrence of stillbirth. Summer pasture access was associated with an increased risk of stillbirth. As expected, there was a significant production decrease in the first DHI test day production for both cows and heifers that delivered a dead calf. At the first test day, first lactation animals that had a stillborn calf produced 0.9 kg/d less than first lactation animals that had delivered a live calf. Mature cows that delivered a dead calf produced 2.4 kg/d less than mature cows that had delivered a live calf. This difference between first lactation animals and mature cows remained consistent in the 305D milk production records. The occurrence of a stillbirth at calving was associated with an increased number of days open (OR=1.17), which has both biological and economical significance to the producer. Interestingly, there was no significant association between the occurrence of stillbirth and the risk of being culled, during or at the end of lactation.

## Significance

The rate of stillbirth in Canadian dairy cattle is substantial, with a herd average of 7.6%. Frequency of observation and the use of video surveillance are associated with a reduction in stillbirth. Excessive heifer body condition was associated with increased stillbirth. There was significant production decreases for both first lactation and multiparous cows that had stillbirth versus cows that delivered a live calf. In addition, stillbirth at calving was associated with an increase number of days open, but not with an increased risk of culling.